

Washington Transportation Plan

Emerging Directions

- The imbalance of demand and capacity on our system causes significant delay that affects the quality of people's lives. This imbalance will grow as the state experiences increases in population and jobs resulting in an increase of travel unmatched by new investment in highway system capacity. WSDOT is pursuing a practical and balanced strategy, which includes operational improvements (HOV lanes, ramp metering, incident response, traveler information, and signal synchronization) and targeted capital investments to get the most out of the existing system and restore lost productivity.
- History suggests that, although large-scale corridor improvement plans are desirable as a long-range vision, funding reality says that we need smaller scale affordable capital investments targeting specific traffic restrictions. Targeting capital investments at bottleneck and chokepoint locations would be less expensive than full corridor build-outs, but could deliver significant delay savings and restored productivity. These improvements offer the greatest return on investment.
- The Legislature's 2003 Transportation Funding Package is an example in delivering these targeted investments. For example, the package provides \$485 million for targeted improvements to I-405 at the worst congested locations: the Kirkland Crawl, through the Wilburton Tunnel approaching I-90 southbound, and at the I-405/SR 167 Interchange vicinity. Similarly, the package targets funding at other locations where traffic flow improvements can make a difference.

- Bottleneck and chokepoint investment options could be developed to improve travel for commuters, freight, interregional movement, recreation, and event access. However, new analysis techniques are needed to identify and prioritize the optimal combination of investments.

The Washington State Transportation Commission and the Washington State Department of Transportation are in the process of updating the Washington Transportation Plan. This long range plan is based on data analysis and is focused on ten issues: System Preservation, System Efficiencies, Safety, Transportation Access, Bottlenecks and Chokepoints, Economy and Jobs, Moving Freight, Future Visions, Health and Environment and Funding and Governance. This plan will shape future transportation budget proposals.

For more on this topic: www.wsdot.wa.gov/planning/wtp

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Bottlenecks and Chokepoints

What opportunities for investment in new facility and system assets can help address system chokepoints and bottlenecks, the most effective near-term solution through expanding capacity to move people and goods in shorter times and more reliable times?

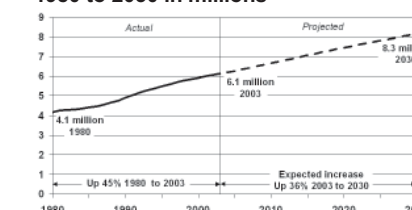
In Washington State, the growth in travel demand has outpaced expansion of transportation system capacity. Additionally there is little evidence that major levels of new investment in highway system capacity will be forthcoming, leaving the state with a backlog of capacity needs now and in the future. This imbalance of demand and capacity occurs in virtually every mode of transportation - at our airports, on our rail lines, and especially on our roadway systems.

The growing demand/capacity imbalance affects citizens' daily lives and almost every sector of economic activity. Commutes to work are time-consuming and often aggravating. Non-work trips, too, must be planned to avoid congestion or with an extra time allowance to account for the lack of reliability in travel times. Freight delivery becomes slower and less reliable. Air pollution is exacerbated by cars and trucks stuck in traffic. Even rural areas that have never seen traffic jams are penalized when highway congestion associated with urban areas interferes with their agricultural products reaching ports and customers.

Washington is Growing

Population and jobs are expected to continue to grow in Washington State. This population growth will translate into substantial increases in travel demand. Washington's workforce is also growing and will continue to a projected 3.9 million by the year 2030. This growth is leading to more travel and compounding delay.

Population In Washington 1980 to 2030 in millions



Vehicle Miles Traveled in Washington 1980 to 2030



**Washington State
Department of Transportation**

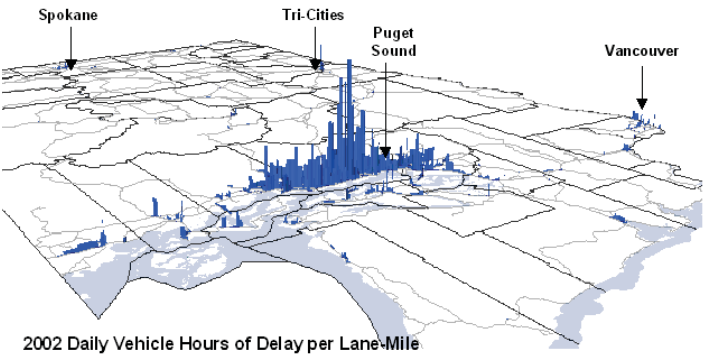


**Washington State
Transportation Commission**

Bottlenecks and Chokepoints

Delay Occurs Mostly in Urban Areas

There is a projected growth in travel that will be concentrated in Puget Sound, Spokane, and Vancouver. Consequently, the gap between demand and capacity will grow wider in the future, especially in the major urban areas and high traffic volume corridors.

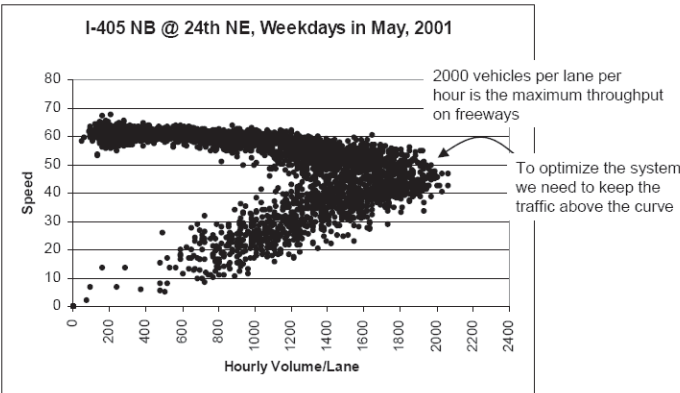


Delay is more prevalent in urban areas with the greatest delay found in the Central Puget Sound area. The total delay across the state is estimated to be over 365,000 hours per weekday and represents about \$1.6 billion annually in lost time.

Congestion Actually Reduces Capacity

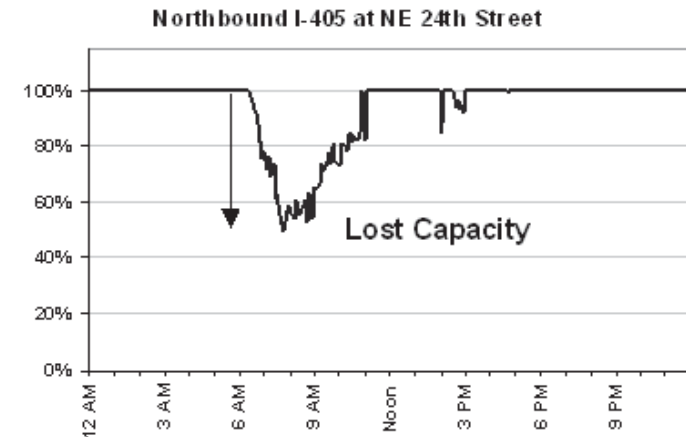
Congestion in the form of vehicle delay creates inefficiency and has the effect of reducing freeway capacity. The graph below illustrates that although congestion increases and freeway speeds drop below the posted speed limit, the total throughput of the freeway increases until a maximum throughput is reached at about 45 mph. If congestion worsens beyond this point speeds and total throughput drop rapidly. To optimize the efficiency of the freeway system we need to keep the traffic flow on top of the curve.

Congestion reduces the capacity of roadways by up to 50%.



This efficiency loss can be seen more clearly in this graph. On a section of I-405 during the morning commute the throughput lost due to congestion was equal to nearly half the highway's capacity. In other words, at the very time when the capacity is most needed the equivalent of one whole lane (out of two general purpose lanes) is lost to congestion. These efficiency losses often occur at bottleneck and chokepoint locations, which can severely hinder the entire system's performance.

Percent of Lane Capacity Lost Due to Delay



Bottlenecks and Chokepoints are Major Causes of Delay

Bottlenecks and chokepoints are typically locations on the system where geometry and traffic patterns contribute to congestion. Examples include the Kirkland crawl on I-405, the Southcenter hill climb on I-5, SR-18 between I-5 at Federal Way and SR-167 at Auburn, the Renton S-curves on I-405, US 2 near Monroe, and interchanges such as I-5/I-90 in Seattle, I-405/I-90 in Bellevue, and I-5/SR 16 in Tacoma.

In addition, weather can cause congestion or affect the passability of a roadway creating a bottleneck or chokepoint. Avalanche control on the I-90 Snoqualmie Pass and roadways closed due to spring thaw restrictions are examples of weather related bottlenecks and chokepoints throughout the state.

Operational and Targeted Capital Investments Can Improve Roadway Productivity

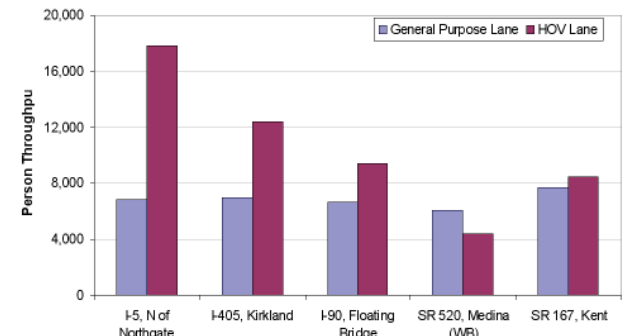
The state currently manages a number of programs to improve the productivity of our highway system. These programs include operational measures and capital investments.

Washington State is considered a leader in the use of high occupancy vehicle (HOV) lanes, ramp metering, and signal synchronization to improve the maximum throughput of a roadway experiencing congestion.

HOV Lanes

HOV lanes increase the efficiency of our system in three ways: by limiting the number of vehicles, overcrowding of the lane is prevented and vehicle throughput is increased, while the higher occupancy rate increases person-throughput and creates an incentive to commute via HOV modes.

People Moved in General Purpose and HOV Lanes (2002) PM Peak Period Peak Direction



This graph illustrates that in general on the Puget Sound freeways more people are moved in most HOV lanes than the average general purpose lane during the peak period. In this way HOV lanes help increase system efficiency and allow the region to accommodate increased demand.

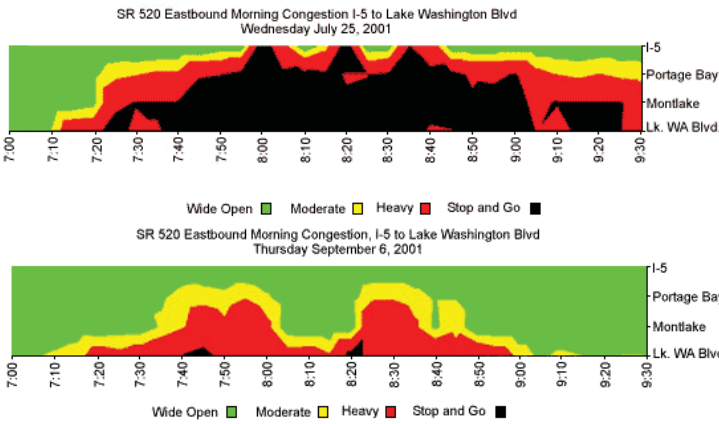
Fixing Bottlenecks and Chokepoints

Targeted traffic flow improvements can also make a significant difference in system performance. The recently completed I-405/SR 167 Flyover ramp is a good example of one such targeted investment.

Prior to the opening of the new ramp stop-and-go conditions occurred weekday mornings between 6:45 and 8:00 am. Immediately after the opening of the new ramp, the stop-and-

Ramp Meters

The effect of ramp metering in reducing delay is well documented. These graphs provide a comparison to show the benefits of ramp metering on SR 520. The black/darkest shading shows stop-and-go traffic conditions. Prior to ramp metering, stop-and-go conditions occurred between 7:25 and 9:25 am. After the ramp metering, most of the stop-and-go condition was eliminated.



go condition was almost entirely eliminated. In the past year we've seen continued growth in the I-405 mainline volumes as well as the I-405 southbound to SR 167 southbound ramp. While serving higher volumes, the congestion at the interchange area is still considerably lower than the conditions prior to the project. On weekends, both the stop and go traffic and heavy congestion conditions have been essentially eliminated.

Average Weekday Congestion I-405 Southbound

